I. Amendments to Claims

This listing of claims will replace all prior versions, and listings of claims in the application:

Listing of Claims:

Claims 1-53.

54. (Currently Amended) A pharmaceutically acceptable capsaicin composition for relieving pain at a site in a human or animal in need thereof comprising synthetic trans capsaicin having a purity of at least about 97% and at least one pharmaceutically acceptable vehicle suitable for infiltration or injection, wherein said synthetic capsaicin is prepared by:

a) alkylating 3-methyl butyne with halovaleric acid or to obtain 8-methyl-6-nonynoic acid;

b) reducing said 8-methyl-6-nonynoic acid to obtain trans-8-methyl-6-nonenoic acid;

c) activating said 8-methyl-6-nonenoic acid to obtain an acid halide or activated acid derivatives; and

d) acylating 4-hydroxy-3-methoxybenzylamine hydrochloride with said acid halide to obtain trans-capsaicin.

55. (Original) The composition of claim 54, wherein said trans capsaicin is used for the treatment of nociceptive pain, neuropathic pain, pain from nerve injury, pain from neuralgia, pain from myalgias, pain associated with painful trigger points, pain from tumors in soft tissues, pain associated with neurotransmitter-dysregulation syndromes and pain associated with orthopedic disorders.

56. (Original) The composition of claim 54, wherein said trans capsaicin is used for the treatment of orthopedic disorders selected from the group consisting of conditions of the foot, knee, hip, spine, shoulders, elbow, hand, head and neck.

57. (Currently Amended) The composition of claim 54, wherein said ~~pure~~ trans capsaicin is provided in an injectable formulation.

58. (Cancelled)

59. (Previously Presented) The composition of claim 54, wherein said trans-capsaicin has a purity of about 98% or greater.

60. (Previously Presented) The composition of claim 54, wherein said trans-capsaicin has a purity of about 99% or greater.

61. (Cancelled)

62. (Previously Presented) The pharmaceutical composition of claim 54, wherein said vehicle comprises about 20% PEG 300, about 10 mM histidine and about 5% sucrose in water for injection.

63. (Previously Presented) The composition of claim 54, wherein step a) comprises alkylating 3-methyl butyne with ω-haloalkanic acid to obtain ω-alkynoic acid analogues.

64. (Previously Presented) The composition of claim 54, wherein step a) comprises the steps of:

i) mixing anhydrous tetrahydrofuran with hexamethylphosphoramide and cooling said mixture to about -78°C to about -60°C;

ii) adding to said mixture of step i) 3-methyl butyne followed by a drop wise addition of a base at a temperature from about -78°C to about -65°C to obtain a second mixture;

iii) warming said second mixture up to about -30°C while stirring; and

iv) adding drop wise a halovaleric acid in anhydrous tetrahydrofuran at a temperature of about -30°C, said halovaleric acid added in a sufficient amount to convert said 3-mehtyl butyne to said 8-methyl-6-nonynoic acid, then gradually warming to room temperature and stirring to obtain a reaction mixture.

65. (Previously Presented) The composition of claim 63, further comprising:

i) adding 3M hydrochloric acid to said reaction mixture and extracting said reaction mixture with ethyl acetate;

ii) washing said extracted reaction mixture with brine to yield a crude product.

66. (Previously Presented) The composition of claim 64, further comprising:

i) purifying said crude product; and

ii) removing solvents under vacuum to provide a step a) intermediate product.

67. (Previously Presented) The composition of claim 66, wherein said crude product is purified by column chromatography.

68. (Previously Presented) The composition of claim 66, wherein said crude product is purified by acid-base extraction.

69. (Previously Presented) The composition of claim 66, wherein said crude product is purified by vacuum distillation.

70. (Previously Presented) The composition of claim 66, wherein said step a) intermediate product is 8-methyl-6-nonynoic acid.

71. (Previously Presented) The composition of claim 64, wherein said halovaleric acid is selected from the group consisting of bromovaleric acid, chlorovaleric acid, fluorovaleric acid, iodovaleric acid and astatinovaleric acid, 1-mesyloxyvaleric acid, 1-tosyloxyvaleric acid.

72. (Previously Presented) The composition of claim 71, wherein said halovaleric acid is bromovaleric acid.

73. (Previously Presented) The composition of claim 64, wherein 1,2-dimethyl-3,4,5,6-tetrahydro-(1H) pyrimidinone is substituted for hexamethylphosphoramide in step i).

74. (Previously Presented) The composition of claim 65, wherein said base is selected form the group consisting of *n*-BuLi, *sec*-BuLi, *t*-BuLi, lithium di(isopropyl) amide, sodium hydride, sodium amide, lithium amide, methyl lithium, methyl magnesium bromide, ethyl magnesium bromide, alkyl or aryl magnesium halides or mixture thereof.

75. (Previously Presented) The composition of claim 74, wherein said base is *n*-butyllithium.

76. (Previously Presented) The composition of claim 54, wherein step b) comprises the steps of:

i) dissolving said 8-methyl-6-nonynoic acid in a mixture of anhydrous tetrahydrofuran and *t*-butyl alcohol to obtain a solution and cooling said solution to about -55°C to about -40°C ;

ii) condensing ammonia to said solution to a temperature of about -50°C to about -33°C ;

iii) adding sodium piece-wise and stirring at a temperature from about -45°C to about -30°C and stirring for a sufficient period of time to dissolve said sodium, and

iv) adding ammonium chloride, warming to room temperature an allowing the ammonia to evaporate to obtain a reaction mixture.

77. (Previously Presented) The composition of claim 76, wherein additional lithium is added after step iii).

78. (Previously Presented) The composition of claim 76, wherein step iii) comprises adding lithium at a temperature from about -65°C to about -45°C and stirring for a sufficient period of time to dissolve said lithium.

79. (Previously Presented) The composition of claim 76, further comprising:

i) adding water to said reaction mixture;

ii) acidifying said reaction mixture with 6N hydrochloric acid to a pH of about 2 to about 3;

iii) extracting said reaction mixture with ethyl acetate, washing with brine and drying over anhydrous sodium sulfate; and

iv) filtering and removing solvents under vacuum to obtain a step b) intermediate product.

80. (Previously Presented) The composition of claim 79, wherein said step b) intermediate product is trans-8-methyl-nonenoic acid.

81. (Previously Presented) The composition of claim 78, wherein step ii) is omitted.

82. (Previously Presented) The composition of claim 76, wherein lower alkyl amines are substituted for said ammonium of step ii).

83. (Previously Presented) The composition of claim 76, wherein sodium is substituted for said lithium of step iii).

84. (Previously Presented) The composition of claim 76, wherein secondary butyl alcohol (*sec*-BuOH), ethyl alcohol (EtOH), or other alkyl alcohols are substituted for said *t*-butyl alcohol of step i).

85. (Previously Presented) The composition of claim 76, wherein lithium and liquid ammonia or sodium and liquid ammonia are substituted for said lithium, said tetrahydrofuran and said liquid ammonia.

86. (Previously Presented) The composition of claim 78, further comprising the steps of:

i) stirring said reaction mixture overnight to evaporate ammonia ;

ii) adding additional anhydrous tetrahydrofuran and ammonium chloride, stirring said mixture for a sufficient time to neutralize excess lithium;

iii) adding ice-water portion wise;

iv) extracting said mixture with ethyl acetate, washing with brine and drying over anhydrous sodium sulfate; and

v) filtering and removing solvents under vacuum to produce a step b) intermediate product.

87. (Previously Presented) The composition of claim 78, further comprising the steps of:

i) cooling the reaction mixture and quenching with ice-water;

ii) acidifying said mixture with 6N hydrochloric acid added portion-wise to a pH of about 2 to about 3;

iii) extracting said mixture with ethyl acetate, washing with brine and drying over anhydrous sodium sulfate;

iv) filtering and concentrating under vacuum at a temperature of about 30°C to obtain a crude product.

88. (Previously Presented) The composition of claim 87, further comprising the step of purifying said product by flash column chromatography to obtain a step b) intermediate product.

89. (Previously Presented) The composition of claim 87, further comprising the step of purifying said crude product by vacuum distillation.

90. (Previously Presented) The composition of claim 54, wherein step c) comprises the steps of:

i) adding drop wise a thionyl halide to said 8-methyl-nonenoic acid at room temperature to form a solution;

ii) heating said solution at about 50°C to about 75°C for a sufficient period of time to convert said 8-methyl-6-nonenoic acid to said acid halide; and

iii) removing excess thionyl halide under vacuum to obtain a step c) intermediate product.

91. (Previously Presented) The composition of claim 90, wherein said thionyl halide is thionyl bromide.

92. (Previously Presented) The composition of claim 90, wherein said thionyl halide is thionyl chloride.

93. (Previously Presented) The composition of claim 90, wherein said step c) intermediate product is an acid halide.

94. (Previously Presented) The composition of claim 93, wherein said acid halide is acid bromide.

95. (Previously Presented) The composition of claim 93, wherein said acid halide is acid chloride.

96. (Previously Presented) The composition of claim 93, wherein said acid halide is an activated carboxylic acid.

97. (Previously Presented) The composition of claim 96, wherein said activated carboxylic acid is an imidazolide.

98. (Previously Presented) The composition of claim 96, wherein said activated carboxylic acid is an carbodiimide.

99. (Previously Presented) The composition of claim 54, wherein step d) comprises the steps of:

i) mixing 4-hydroxy-3-methoxy benzylamine hydrochloride and dimethylformamide;

ii) adding portion-wise at room temperature to said mixture of step i) aqueous sodium hydroxide and stirring to obtain a reaction mixture;

iii) adding acid halide in anhydrous ether at a temperature of about 0°C to about 10°C for a sufficient period of time to convert said acid halide to an amide; and thereafter

iv) gradually warming said mixture to room temperature and stirring.

100. (Previously Presented) The composition of claim 99, further comprising the steps of:

i) adding water to said mixture and extracting said mixture with ethyl acetate to obtain an ethyl acetate extract;

ii) washing said extract with 1N hydrochloric acid and, thereafter, washing with sodium bicarbonate;

iii) washing said solution with brine and drying over anhydrous sodium sulfate;

iv) filtering and removing solvents under vacuum to obtain a crude trans capsaicin product.

101. (Previously Presented) The composition of claim 100, further comprising the steps of:

i) purifying said crude product by column chromatography to obtain trans-capsaicin product.

102. (Previously Presented) The composition of claim 99, wherein potassium hydroxide, lithium hydroxide, sodium carbonate, potassium carbonate, or an alkyl amine is substituted for said aqueous sodium hydroxide of step ii).

103. (Previously Presented) The composition of claim 99, wherein 4-hydroxy-3-methoxy benzylamine is substituted for said 4-hydroxy-3-methoxy benzylamine hydrochloride of step i).

104. (Previously Presented) The composition of claim 102, wherein said alkyl amine is selected from the group consisting of triethylamine, Hunig's base, 4-dimethylaminopyridine and pyridine.

105. (Previously Presented) The composition of claim 99, wherein tetrahydrofuran, 2-dimethoxyethane, acetonitrile, dichloromethane, chloroform, or methyl ethyl ketone is substituted for said dimethylformamide in step i).

106. (Currently Amended) A ~~composition~~ method of purifying the trans-capsaicin product of claim 96, comprising the steps of:

i) dissolving said crude trans-capsaicin product in a mixture of ether/hexane and heating said mixture to about 40°C to about 45°C;

ii) cooling said mixture to room temperature or bellow room temperature; and

iii) filtering said mixture to provide a purified trans-capsaicin product.

107. (Currently Amended) The ~~composition~~ method of claim 106, wherein step iii) comprises filtering said mixture and washing said mixture with a mixture of ether/hexane and drying under vacuum to obtain a purified trans-capsaicin product.

108. (Currently Amended) The ~~composition~~ method of claim 54, further comprising purifying said trans-capsaicin using a semi-preparative HPLC.

109. (Currently Amended) The ~~composition~~ method of claim 100, further comprising purifying said crude trans-capsaicin product using a semi-preparative HPLC.

110. (Currently Amended) The ~~composition~~ method of claim 101, further comprising purifying said trans-capsaicin product using a semi-preparative HPLC.

111. (Currently Amended) The ~~composition~~ method of claim 108, wherein the purification using the semi-preparative HPLC provides for a resulting ultra-purified trans-capsaicin having a purity of about 97% or greater capsaicin.

112. (Currently Amended) The ~~composition~~ method of claim 108, wherein the purification using the semi-preparative HPLC provides for a resulting ultra-purified trans-capsaicin having a purity of about 98% or greater capsaicin.

113. (Currently Amended) The ~~composition~~ method of claim 108, wherein the purification using the semi-preparative HPLC provides for a resulting ultra-purified trans-capsaicin having a purity of about 99% or greater capsaicin.